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NASA-15107 (June 2004)

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

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SECTION 15107

PLASTIC PIPE AND FITTINGS

06/04

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NOTE: Delete, revise, or add to the text in this section to cover project requirements. Notes are for designer information and will not appear in the final project specification.

This section covers polyvinylchloride (PVC), polyethylene (PE), acrylonitrile-butadiene-styrene (ABS), and chlorinated polyvinylchloride (CPVC) pipe and pipe fittings for general use. Ordinary methods of installation are also included. This section does not cover the use of plastic pipe in specialized systems or processes or the installation of such systems.

Associated work specified in other sections includes identification, anchors, flashing, hangers and supports, valves and cocks, insulation, and testing.

Drawings should show:

Location where each size of pipe is installed

Provisions for expansion and contraction

Elevation of piping slope, extent of service, and location of terminations or connections to other equipment

Where piping is to be concealed or exposed, sufficient sections and details for completion of construction.

****

PART 1 GENERAL

1.1 REFERENCES

****

NOTE: The following references should not be manually edited except to add new references. References not used in the text will automatically be deleted from this section of the project specification.

****

The publications listed below form a part of this section to the extent referenced:

ASTM INTERNATIONAL (ASTM)

ASTM D 1527	(1999e1) Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe, Schedules 40 and 80
ASTM D 1784	(2003) Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
ASTM D 1785	(2003) Standard Specification for Poly (Vinyl Chloride) (PVC), Plastic Pipe, Schedules 40, 80, and 120
ASTM D 2104	(2003) Standard Specification for Polyethylene (PE) Plastic Pipe, Schedule 40
ASTM D 2235	(2001) Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe and Fittings
ASTM D 2239	(2003) Standard Specification for Polyethylene (PE) Plastic Pipe (SIDR-PR), Based on Controlled Inside Diameter
ASTM D 2241	(2004) Standard Specification for Poly(Vinyl Chloride) (PVC) Pressure Rated Pipe (SDR Series)
ASTM D 2447	(2003) Standard Specification for Polyethylene (PE) Plastic Pipe, Schedules 40 and 80 Based on Outside Diameter
ASTM D 2464	(1999) Standard Specification for Threaded Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D 2466	(2002) Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 40
ASTM D 2467	(2002) Standard Specification for Socket-Type Poly(Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
ASTM D 2468	(1993) Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Plastic Pipe Fittings, Schedule 40
ASTM D 2564	(2002) Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems
ASTM D 2609	(2002) Standard Specification for Plastic Insert Fittings for Polyethylene (PE)

	Plastic Pipe
ASTM D 2661	(2002) Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Schedule 40, Plastic Drain, Waste, and Vent Pipe and Fittings
ASTM D 2680	(2001) Standard Specification for Acrylonitrile-Butadene-Styrene (ABS) Composite Sewer Piping
ASTM D 2683	(1998) Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing
ASTM D 2751	(1996a) Standard Specification for Acrylonitrile-Butadiene-Styrene (ABS) Sewer Pipe and Fittings
ASTM D 2855	(1996; R 2002) Standard Practice for Making Solvent-Cemented Joints with Poly(Vinyl Chloride) (PVC) Pipe and Fittings
ASTM D 3261	(2003) Standard Specification for Butt Heat Fusion Polyethylene (PE) Plastic Fittings for Polyethylene (PE) Plastic, Pipe and Tubing
ASTM F 437	(1999) Standard Specification for Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
ASTM F 438	(2002e1) Standard Specification for Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40
ASTM F 439	(2002e1) Standard Specification for Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80
ASTM F 441/F 441M	(2002) Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Schedules 40 and 80
ASTM F 442/F 442M	(1999) Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR)

1.2 GENERAL REQUIREMENTS

****

NOTE: If Section 15003 GENERAL MECHANICAL PROVISIONS is not included in the project specification, applicable requirements therefrom should be inserted and the following paragraph

deleted.

****

Section 15003 GENERAL MECHANICAL PROVISIONS applies to work specified in this section.

1.3 SUBMITTALS

****

NOTE: Review submittal description (SD) definitions in Section 01330 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control. Include a columnar list of appropriate products and tests beneath each submittal description.

****

The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES in sufficient detail to show full compliance with the specification:

SD-02 Shop Drawings

Installation Drawings for plastic piping systems shall be in accordance with paragraph entitled, "Installation," of this section.

SD-03 Product Data

Manufacturer's Catalog Data shall be submitted in accordance with paragraph entitled, "General Requirements," of this section.

SD-07 Certificates

Certificates shall be submitted for Potable Water Systems Materials in accordance with paragraph entitled, "General Requirements," of this section.

Seal of approval of [National Sanitation Foundation testing laboratory] [approved testing laboratory acceptable to public health officials] for .

1.4 GENERAL REQUIREMENTS

Manufacturer's Catalog Data shall be submitted for plastic pipe and fittings, for each size and type.

Certificates shall include a seal of approval from the [National Sanitation Foundation testing laboratory] [approved testing laboratory acceptable to public health officials] for Potable Water Systems Materials.

PART 2 PRODUCTS

2.1 POLYVINYLCHLORIDE (PVC) PIPE

PVC pipe shall be in accordance with ASTM D 1785.

2.1.1 Schedule Pipe (PVC)

****
NOTE: Use Schedule 80 for threaded pipe.
****

Pipe shall be Schedule [40] [80].

Material shall be PVC Class 12454-B in accordance with ASTM D 1784.

2.1.2 SDR-PR Nonthreaded Pipe (PVC)

Nonthreaded standard dimension ratio/pressure rated (SDR-PR) pipe shall be in accordance with ASTM D 2241.

Pipe shall have SDR of [13.5] [17] [21] [26] [32.5] [41] [64].

Material shall be PVC Class 12454-B.

2.1.3 Fittings (PVC)

2.1.3.1 Socket-Type, Schedule 40

Material shall be PVC in accordance with ASTM D 2466.

2.1.3.2 Socket-Type, Schedule 80

Material shall be PVC in accordance with ASTM D 2467.

2.1.3.3 Threaded, Schedule 80

Material shall be PVC in accordance with ASTM D 2464.

2.1.4 Cement and Lubricant

Solvent cement for pipe and fittings shall be in accordance with ASTM D 2564. Thread lubricant shall be in accordance with the pipe manufacturer's recommendations.

2.2 CHLORINATED POLYVINYLCHLORIDE (CPVC) PIPE

CPVC pipe shall be in accordance with ASTM F 441/F 441M.

2.2.1 Schedule Pipe (CPVC)

****
NOTE: Use schedule 80 for threaded pipe.
****

Pipe shall be Schedule [40] [80].

Material shall be CPVC Class 23447-B in accordance with ASTM D 1784.

2.2.2 SDR-PR Nonthreaded Pipe (CPVC)

SDR-PR nonthreaded pipe shall be in accordance with ASTM F 442/F 442M.

Pipe shall have SDR of [13.5] [17] [21] [26] [32.5].

Material shall be CPVC Class 23447-B in accordance with ASTM D 1784

2.2.3 Fittings (CPVC)

2.2.3.1 Socket-Type, Schedule 40

Material shall be CPVC in accordance with ASTM F 438.

2.2.3.2 Socket-Type, Schedule 80

Material shall be CPVC in accordance with ASTM F 439.

2.2.3.3 Threaded Schedule 80

Material shall be CPVC in accordance with ASTM F 437.

2.2.4 Cement and Lubricant

Solvent cement for pipe and fittings shall be in accordance with ASTM D 2564.

Thread lubricant shall be in accordance with the pipe manufacturer's recommendations.

2.3 POLYETHYLENE (PE) PIPE

2.3.1 Schedule Pipe (PE)

Pipe shall be Schedule 40 and shall be in accordance with ASTM D 2104.

****

NOTE: Material designation is based on the following:

Material Designation	**Hydrostatic Design Stress (psi)**
PE 1404	**400**
PE 2305	**500**
PE 2306	**630**
PE 3306	**630**
PE 3406	**630**

Material Designation	**Hydrostatic Design Stress (kPa)**
PE 1404	**2800**
PE 2305	**3500**
PE 2306	**4400**
PE 3306	**4440**
PE 3406	**4440**

****

Material shall be PE [1404] [2305] [2306] [3306] [3406].

2.3.2 Standard Inside Dimension Ratio-Pressure Rated (SIDR-PR) Pipe

SIDR-PR pipe shall be in accordance with ASTM D 2239.

SIDR shall be [5.3] [7] [9] [11.5] [15].

Material shall be PE [1404] [2305] [3306] [3406].

2.3.3 Schedule, Outside-Diameter-Controlled

Schedule pipe that is outside-diameter-controlled shall be in accordance with ASTM D 2447.

Pipe shall be Schedule [40] [80].

Material shall be PE [1404] [2305] [2306] [3306] [3406].

2.3.4 Fittings (PE)

2.3.4.1 Schedule 40, Butt Fusion

Schedule 40, butt fusion fittings shall be in accordance with ASTM D 3261.

Pipe shall be [14333-D] [13233].

2.3.4.2 Schedule 80, Butt Fusion

Schedule 80, butt fusion fittings shall be in accordance with ASTM D 3261.

Pipe shall be [14333-D] [13233].

2.3.4.3 Insert Fittings

Insert fittings for PE pipe shall be in accordance with ASTM D 2609.

[Material shall be acrylonitrile-butadiene-styrene (ABS), Type [1] [2].]

[Material shall be PVC class: [12454-B] [12454-C] [11443-B] [14333-D].]

2.3.4.4 Socket-Type for SDR 11.0 Pipe

Socket-type fittings for SDR 11.0 pipe shall be in accordance with ASTM D 2683.

Pipe shall be in accordance with [14333-D] [13233].

2.4 ACRYLONITRILE-BUTADIENE-STYRENE (ABS) PIPE

2.4.1 Schedule Pipe (ABS)

****

NOTE: ABS 1210 has a hydrostatic design stress of 1,000 psi 6900 kilopascal.

ABS 2112 has a hydrostatic design stress of 1,250 psi 8600 kilopascal.

ABS 1316 has a hydrostatic design stress of 1,600 psi 11000 kilopascal.

****

ABS schedule pipe shall be in accordance with ASTM D 1527.

Pipe shall be Schedule 40.

Pipe shall be ABS [1210] [2112] [1316].

2.4.2 SDR-PR Nonthreaded Pipe (ABS)

Nonthreaded SDR-PR pipe shall be in accordance with ASTM D 1527 and ASTM F 442/F 442M.

Pipe shall have SDR of [26] [21] [17] [13.5].

Pipe shall be ABS [1210] [2112] [1316].

2.4.3 Threaded Pipe

Threaded pipe shall be in accordance with ASTM D 1527.

Pipe shall be ABS [1210] [2112] [1316].

2.4.4 Drain, Waste, and Vent Pipe

Drain, waste, and vent pipe shall be in accordance with ASTM D 2661.

2.4.5 Sewer Pipe

Sewer pipe shall be in accordance with ASTM D 2751.

2.4.6 Composite Sewer Piping

Composite sewer piping shall be in accordance with ASTM D 2680.

2.4.7 Fittings (ABS)

2.4.7.1 Schedule 40, Socket-Type

Schedule 40, socket-type fittings shall be in accordance with ASTM D 2468.

Fittings shall be Type [I] [II], Grade [1] [2] [3].

2.4.7.2 Schedule 80, Socket-Type

Schedule 80, socket-type fittings shall be in accordance with ASTM D 1527.

Fittings shall be Type [I] [II], Grade [1] [2] [3].

2.4.7.3 Schedule 80, Threaded

Schedule 80, threaded fittings shall be in accordance with ASTM D 1527.

Fittings shall be Type [I] [II], Grade [1] [2] [3].

2.4.7.4 Drain, Waste, and Vent Fittings

Drain, waste, and vent fittings shall be in accordance with ASTM D 2661.

2.4.7.5 Sewer Pipe Fittings

Sewer pipe fittings shall be in accordance with ASTM D 2751.

2.4.8 Cement and Lubricant

Solvent cement for pipe and fittings shall be in accordance with ASTM D 2235.

Thread lubricant shall be in accordance with the pipe manufacturer's instructions.

PART 3 EXECUTION

3.1 PIPE LAYOUT

****
NOTE: Delete the second paragraph when diagonal piping is desired.
****

Installation shall present a neat, orderly appearance. Openings or passageways shall not be blocked.

[Piping shall be parallel to exterior walls of building.]

[Piping shall be kept free from contact with structure or installed items to prevent noise transmission.]

3.2 INSTALLATION

Installation drawings shall be submitted.

Plastic piping shall be installed in accordance with the manufacturer's installation instructions.

3.2.1 Vertical Piping

CPVC piping shall be supported at intervals of not more than 3 feet 900 millimeter.

All other piping shall be supported at intervals of not more than 4 feet 1200 millimeter.

Piping shall be secured at sufficiently close intervals to keep pipe in alignment and to support weight of pipe and contents.

Supports shall be installed at each floor.

Piping shall be secured in position by approved stakes or braces when piping is to stand free, or when no structural element is available for providing stability during construction.

3.2.2 Horizontal Piping, Suspended

All piping shall be supported at intervals in accordance with the

manufacturer's instructions and in no case not more than 3 feet 900 millimeter.

Hangers shall be installed at ends of runs or branches and at each change of direction or alignment.

3.2.3 Horizontal Piping, Underground

Piping shall be laid on a firm bed for the entire trench length, except where otherwise supported.

Partial backfilling and cradling shall be employed to secure piping during backfilling operations.

Piping laid on grade shall be firmly braced prior to embedment in concrete.

3.2.4 Cutting

Cuts shall be made square with pipe and burrs shall be removed by smoothing edges.

3.2.5 Joints

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NOTE: Threaded joints should not be specified for schedule 40 or thinner wall pipe.

****

[Threaded joints shall be used. Joints shall be tightened by strap wrench to not more than one full turn beyond hand tight.]

[Joints shall be solvent cemented in accordance with ASTM D 2855.]

Junction with other materials shall be the type of adapter and technique as recommended by the pipe manufacturer.

-- End of Section --